



Enhancing Manufacturing Competitiveness in UAE SMEs: The Influence of Process Quality Improvement and Lean Practices

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ABSTRACT

This research investigates the relationship between process quality improvement, lean practices, and manufacturing competitive performance in Small and Medium-sized Enterprises (SMEs) within the United Arab Emirates (UAE). The UAE has emerged as a dynamic hub for SME manufacturing, making it crucial to examine factors that contribute to their competitive advantage. The research employs a mixed-methods approach, combining qualitative data from in-depth interviews with key industry experts and quantitative data obtained through structured surveys distributed among a diverse sample of SME manufacturing firms across different sectors. The study focuses on evaluating the adoption and implementation of process quality improvement initiatives and lean practices within these organizations. The findings highlight a strong positive correlation between effective process quality improvement and lean practices and improved manufacturing competitive performance among UAE SMEs. Firms that successfully integrated lean methodologies into their processes demonstrated higher levels of operational efficiency, reduced waste, increased productivity, and improved product quality. Additionally, the research identifies critical success factors and challenges in the implementation of process quality improvement and lean practices in the context of UAE SMEs. Factors such as top management commitment, employee involvement, and access to training and resources are instrumental in fostering a culture of continuous improvement.

1. INTRODUCTION

In the rapidly growing area of global trade and industry, Small and Medium-sized Enterprises (SMEs) play a pivotal role in driving economic growth and fostering innovation. Within the United Arab Emirates (UAE), the SME sector has emerged as a significant contributor to the country's manufacturing prowess, making it imperative to explore strategies that enhance their competitive performance (Moeuf et al., 2018). Among these strategies, process quality improvement and the adoption of lean practices have gained increasing attention as potent means to streamline operations

and elevate competitiveness (Ali Alzoubi, 2021). Manufacturing SMEs in the UAE face a multitude of challenges, ranging from global market fluctuations and technological disruptions to resource constraints and intense competition. To navigate this complex business environment successfully, SMEs must seek avenues to optimize their internal processes and production systems continually (Muhammad Turki Alshurideh et al., 2022a; Lee, 2021). Process quality improvement involves the systematic assessment and enhancement of existing operational procedures to

eliminate defects, reduce waste, and enhance overall efficiency (El Khatib et al., 2022). On the other hand, lean practices, rooted in the principles of lean management, emphasize a philosophy of continuous improvement, waste reduction, and value creation, ultimately leading to better resource utilization and increased customer satisfaction (Citroen, 2011).

Given the increasing significance of SMEs in driving economic prosperity and the proven benefits of process quality improvement and lean practices in large-scale manufacturing enterprises, it becomes imperative to investigate their impact on the competitive performance of manufacturing SMEs within the UAE context. (Savolainen, 1999) By understanding the interplay between process optimization, lean thinking, and competitiveness, policymakers, industry experts, and business owners can devise tailored strategies to bolster the SME manufacturing sector and enhance the nation's industrial landscape (Gaytan et al., 2023; Emad Tariq et al., 2022; Yu et al., 2018).

While some research exists on the application of process quality improvement and lean practices in the context of larger corporations, there is a notable gap in the literature concerning their specific impact on UAE SMEs (Abudaqa et al., 2022). The unique challenges, resource constraints, and cultural nuances prevalent in SME environments necessitate dedicated exploration to unearth the true potential of these methodologies in fostering competitive advantage (Barusman and Habiburrahman, 2022).

Hence, this research endeavors to delve into the relationship between process quality improvement, lean practices, and manufacturing competitive performance in UAE SME industries (Battistoni et al., 2013; M T Nuseir et al., 2022a). Through a mixed-methods approach, combining qualitative insights from key industry experts and quantitative data from SMEs operating in diverse sectors, this study aims to provide a comprehensive understanding of the factors that contribute to successful process optimization and lean implementation (Nawanir et al., 2013). By identifying critical success factors and challenges, this research will offer valuable insights to SME owners and managers seeking to enhance their firms' competitive positioning (Almasaeid et al., 2022). Moreover, the findings will also serve as a knowledge base for policymakers and industry

stakeholders to formulate targeted interventions aimed at fortifying the UAE SME manufacturing sector's resilience and global standing (Bawaneh et al., 2023).

In the following sections, we will detail the research methodology, present the findings, and discuss the implications of our study. Ultimately, we envision that this research will not only contribute to the academic discourse on manufacturing competitiveness but also yield actionable insights to drive tangible improvements in UAE SME industries.

1.1. Objectives of the Study

- To assess the current state of process quality improvement and lean practices adoption in manufacturing SME industries within the UAE.
- To examine the relationship between process quality improvement initiatives and manufacturing competitive performance in UAE SME industries.
- To investigate the impact of lean practices on operational efficiency, waste reduction, and productivity in UAE SME manufacturing firms.

2. LITERATURE REVIEW

2.1. Process Quality Improvement and Lean Practices

One of the real extents of any organization is to guarantee that they furnish their clients with the best of the quality and incentive for their cash so as to increase the greatest dimension of consumer loyalty (Akour et al., 2023; AlDhaheri et al., 2023; Farrukh et al., 2023). The organization embraces diverse approaches to guarantee quality enhancements inside the organization's procedures to improve the nature of their products and services. According to research conducted by (H. M. Alzoubi et al., 2022b; Kassem and Martinez, 2022), there are distinctive courses through which organizations accomplish effectiveness and improve their business tasks (T M Ghazal et al., 2023a; M. El Khatib et al., 2022; M T Nuseir et al., 2022b). One such instrument is the 20 keys procedure that is utilized by the organization to improve its speed of development and learning (H. M. Alzoubi et al., 2022c; T M Ghazal et al., 2023b). The research was directed with a means to examine the utilization of 20 keys techniques for

the improvement of the business tasks and the effectiveness of organizations regarding the present global market (I. Akour et al., 2022). The researcher utilized coordinated arrangements of various devices that are utilized so as to build the productivity of the organization alongside the expanded dimension of the nature of items while synchronizing them with the decrease in the expense (El Khatib et al., 2021; Nuseir et al., 2020). The authors used integrated sets of different tools that are used in order to increase the efficiency of the organization along with an increased level of quality of products while synchronizing them with the reduction in the cost (H. Alzoubi et al., 2022; Gulseven and Ahmed, 2022; Nuseir et al., 2021). The findings of the research showed that the 20 keys methodologies are implemented in the organization to increase the efficiency of the organization with an aim to increase the customer's and buyers' satisfaction level (Muhammad Turki Alshurideh et al., 2022b; El Khatib and Ahmed, 2020). The methodology is equally beneficial in increasing the satisfaction of the internal customers; those are the employees of the organization (Al-Kassem et al., 2022; Louzi et al., 2022a; Nuseir et al., 2020).

According to a research conducted in the similar field by (Aityassine et al., 2022; Ghazal et al., 2021), continuous quality improvement methods play a significant role in the success of the organization. The authors considered the continuous quality improvement methods as the foundations of the organization's improvement (Abudaqa et al., 2022; A I Aljumah et al., 2022a). The researchers conducted their research in order to identify the different continuous improvement methodologies and their features and the efforts of the organization to apply this methodology for the improvement of their services (M T Alshurideh et al., 2022; H. M. Alzoubi et al., 2022e; Nuseir and Aljumah, 2022).

The authors used the secondary methodology for the identification of the continuous improvement methodologies where the authors studied the previous "12 member's international expert panel" identified Continuous Quality improvement (CQI) methodologies and their features (El Khatib and Oplencia, 2015; Hani Al-Kassem, 2021). The authors tested the features of the methodologies to find out which of the methodologies met the rigorous and essential standards of the quality

improvements (Ahmed and Nabeel Al Amiri, 2022; Louzi et al., 2022b). The authors used a three-phase modified Delphi process, which was based online (Aljumah et al., 2023). The total number of the sample included the 119 quality improvement experts who were randomly selected and assigned in four online panels. These were from Canada and the United States (Al-Awamleh et al., 2022; A I Aljumah et al., 2022b). The findings of the research found out that for a continuous improvement methodology to be considered as effective, the three most important and significant features are "systematic data-guided activities," iterative development and testing" and "designing with local conditions."

H01: Lean practices have no statistical impact on process quality improvement in "medium-size manufacturing organizations" in the UAE.

2.2. Impact of Continuous Improvement on competitive performance

The major reason why the organization adopts different quality improvement techniques and methods is to enhance the performance of the organization and increase its efficiency in order to gain the maximum level of customer satisfaction and to increase its competitive position in the market (Alshurideh et al., 2022; H. M. Alzoubi et al., 2022f; T M Ghazal et al., 2023c). The authors (Al-Kassem, 2017; Sakkthivel et al., 2022) conducted research to find out the impact that the continuous quality improvements have on the satisfaction level of the customers (Ahmad Ibrahim Aljumah et al., 2022a; Alshurideh, M.T., Al Kurdi, B., Alzoubi, H.M., Sahawneh, N., Al-kassem, 2022). The authors conducted their research based on the fact that the organizations are implementing continuous quality improvement methods to gain maximum level of customer satisfaction and competitive positioning in the market (M Alshurideh et al., 2023; Khan et al., 2022), whereas there lies very limited evidence to the overall achievement of the goal (Ahmed et al., 2022; Al-Marroof et al., 2022b). The aim behind the research was to identify if the organization who adopt continuous quality improvement methods actually improve the level of customer satisfaction by applying these methods (Aljumah et al., 2021a; Muhammad Alshurideh et al., 2023). The research was also carried out to find out which of the practices of the organization are able to facilitate the impacts of the organization's

continuous quality improvement on the level of customer satisfaction (Muhammad Turki Alshurideh et al., 2023b; Mohammed T. Nuseir et al., 2022). The research findings showed that there lay a positive association and impact of continuous quality improvements on the level of customer satisfaction and in the service industry (El Khatib, 2015). The study also found out that the management commitment in the industry aligns with the reward systems (Abudaqa et al., 2021), which are the basic factors that encourage the employees of the organization to efficiently participate in the continuous quality improvement programs (Al-Kassem, 2014; Al-Marroof et al., 2022a; Aljumah et al., 2021b). The result of the research also supported the findings of the previous literature present on the same topic.

H02: Process quality improvement has no statistical impact on the competitive performance of medium-size manufacturing organizations in the UAE.

2.3. Lean Practices and Competitive performance

As per the depiction of (Alshawabkeh et al., 2021; El Khatib et al., 2019) lean practices always play a very significant role in the development and in building the positive reputation of the organization. The main concern of the upper executives of the firms is to analyze different opportunities that can help in the rapid progress of the organization (Ahmad Ibrahim Aljumah et al., 2022b; E. Khatib et al., 2022; Mat Som and Kassem, 2013). This is only possible with the proper implementation of lean practices in the firm, as it helps in increasing the sales and the customer's loyalty (I. A. Akour et al., 2022; H. M. Alzoubi et al., 2022g; Amiri et al., 2020). The main concept behind the whole process of lean management is to enhance the understanding of the management regarding the importance of this system (Nuseir and Aljumah, 2020). The adaptation of this particular process is about accepting the dynamic changes of the market and incorporating them into the organization (Muhammad Turki Alshurideh et al., 2023a; Aziz et al., 2023). In the light of the study (R. S. Al-Marroof et al., 2021b; Khatib et al., 2016). It is affirmed that lean management helps the company in order to improve the quality, factor of risk, development in the manufacturing flexibility with less requirement of space, and the assurance of the effective work environment (Khatib, 2022). In view of (Al-Kassem et al., 2013; H. M. Alzoubi et

al., 2022a; Nuseir, 2020), along with so many benefits, the implementation of lean management faces some serious challenges (Nadzri et al., 2023). The management of the companies tries to come up with the appropriate strategies in order to cope with those challenges of the lean management system (Al-Dmour et al., 2023; Alzoubi and Ahmed, 2019). Besides, there are many benefits involved in this regard which are given below:

- *Improving the confidence of workers*

It is stated in the study of (A. Al-Marroof et al., 2021) that lean management provides the outcomes that help in distinguishing the settled matter. Basically, it adds the level of confidence in the personality of the workers (Alshurideh et al., 2020; El Khatib and Ahmed, 2018). It is due to the fact that with the consistent change in the organization system, the workers of that company would also get trained.

- *Increases the quality and reduces the flaws*

It is affirmed in the study of (Al-Kassem et al., 2012; Lee et al., 2023) that the implementation of lean management helps the organization to improve the quality, and it further reduces the flaws (El Khatib and Ahmed, 2019). Hence, this is much significant to apply the concept on lean management over the company.

H03: Lean Practices has no statistical impact on the Competitive performance of medium-size manufacturing organizations in the UAE.

2.4. Impact of process quality improvement and Lean practices on Competitive Performance

The literature presented by (AlHamad et al., 2021; El Khatib et al., 2020b) argued that the implementation of lean management within the manufacturing sector is important in the company because it helps in the development of the organization (H. M. Alzoubi et al., 2022d; Taher M. Ghazal et al., 2023; Nuseira and Aljumahb, 2020). In fact, the organization that deals in this sector actually needs to incorporate lean management because it provides some very useful information for them in the development and expansion universally. Additionally, (R. S. Al-Marroof et al., 2021a; Muhammad Turki Alshurideh et al., 2023c; M. El Khatib et al., 2021; Nuseir and Elrefae, 2022) stated that the manufacturing industry plays an integral role in temperate advancement in the world's economy. Along with this, it is the leading

sector of the globe that enhances the world's economic stability in a more profound manner.

- *Requires less space*

It is observed that when the stock levels lessened, the need for the labor and the less space will go to require it in order to evaluate it (Alzoubi et al., 2020; Khatib et al., 2016). Additionally, (Akour et al., 2021; Alshurideh et al., 2022) also found that lean management does not actually bring about the collection of cells that the press machines uses to administer with the various direct bits of hardware in the least resources (El Khatib et al., 2020a). (Yasir et al., 2022) stated in the research that keeping these considerations in mind, the concept of lean management is again a much-verified source to develop and build the organization.

- *Ensures a more secure workplace*

It is stated in the study of (Aljumah et al., 2020; Alzoubi et al., 2019) that organization that has the ability to implement lean management in the working staff of their company gains a competitive advantage over their rivals (Arshad et al., 2023; E. Khatib et al., 2021). Along with this, the concept of lean management serves as a tool to make the workplace more secure in every aspect. (Mubeen et al., 2022; Nuseir, 2021; E Tariq et al., 2022; Varma et al., 2023) claimed that the effective implementation of lean management, most of the time, ensures the organization's development.

H04: Lean Practices has no statistical impact on competitive advantage with the mediating effect of process quality improvements in medium-size manufacturing organizations in the UAE.

2.5. Research Model

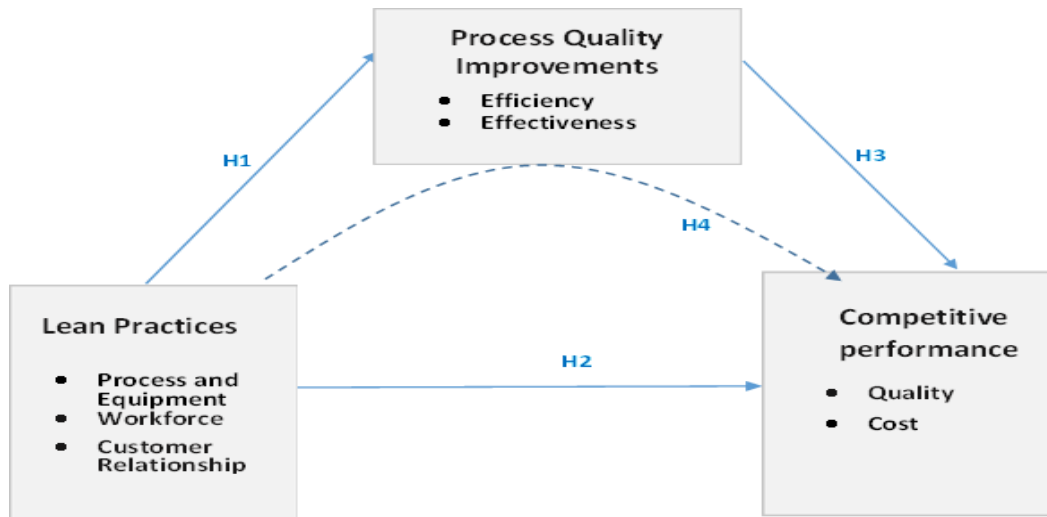


Figure (1)

manufacturing organizations in the UAE.

2.6. Research Hypothesis

H01: Lean practices have no statistical impact on process quality improvement in "medium-size manufacturing organizations" in the UAE.

H02: Process quality improvement has no statistical impact on the competitive performance of medium-size manufacturing organizations in the UAE.

H03: Lean Practices has no statistical impact on the Competitive performance of medium-size manufacturing organizations in the UAE.

H04: Lean Practices has no statistical impact on competitive advantage with the mediating effect of process quality improvements in medium-size

3. METHODOLOGY

The population for the proposed research would include all the SMEs that are small and medium enterprises that are operating in the manufacturing industry of the United Arab Emirates UAE. There are approximately 2295 manufacturing companies that are included in the small and medium manufacturing companies in the UAE region. However, due to the limitation of time and access to each of these industries, the clustering sampling technique has been adopted. As per clustering sampling, the entire population is divided into different groups. In our proposed research, the clustering would be done using the

Emirates as the primary source of sampling. Therefore, the proposed research would use the sample cluster of all the SMEs in the manufacturing industry that is operating in the Emirates of Dubai in the UAE.

The sample size for the proposed research would include the SME manufacturing organizations operating in the Dubai region, which are 25 organizations in total. Therefore the sample size would be 25. The questionnaire was distributed to 25 (middle and upper level) quality control managers of SME manufacturing companies in Dubai as the QC managers have the required knowledge and information regarding the study variables.

3. EMPIRICAL ANALYSIS

This research approach emphasizes the exploration of in-depth insights, meanings, and interpretations rather than numerical data. To conduct a qualitative study with graphical representation of data analysis, researchers typically follow a multi-faceted approach. The first step involves carefully defining the research questions and objectives, ensuring they align with the study's purpose. A 10 questions based questionnaire was used to collect data. The data analysis was limited to know respondents point of view.

The question asked by respondents has demonstrated in figure 2 with its results. The process quality improvement process of the organization has helped to increase the quality of products.

the process quality improvement process of the organization has helped increase the quality of products

25 responses

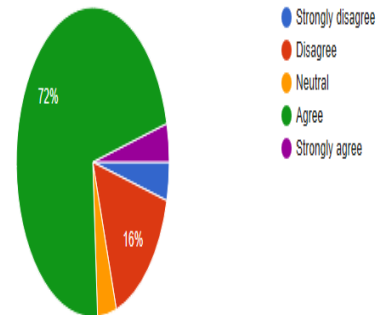


Figure (2)

There are effective process quality improvement practices followed in our organization

there are effective process quality improvement practices followed in our organization

25 responses

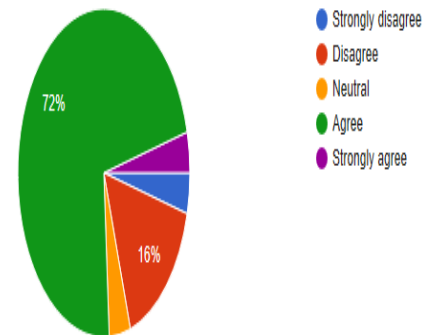


Figure (3)

Our organization competitive advantage lies in the process quality improvement practices

Our organization's competitive advantage lies in the process quality improvement practices

25 responses

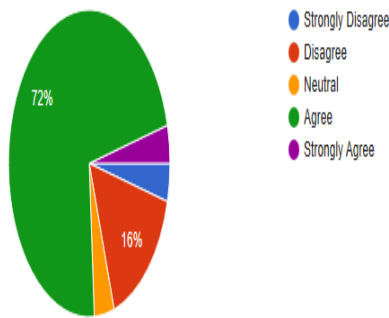


Figure (4)

Lean practices has enabled our organization lower their cost

Lean practices has enabled our organization lower their costs

25 responses

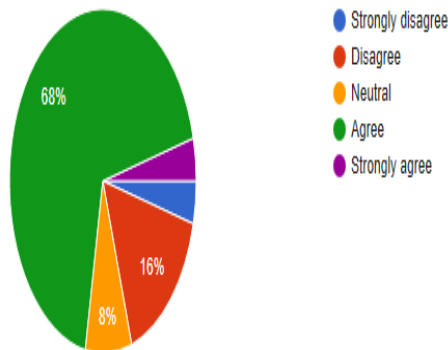


Figure (5)

Lean practices followed in our organization has added value to our final product

lean practices followed in our organization has added value to our final product.

25 responses

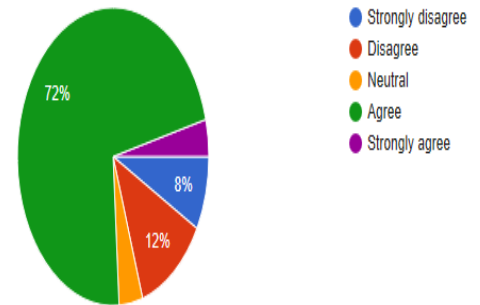


Figure (6)

4. DISCUSSION

The graphical output of the respondents data shows a positive significant impact of process quality improvement. The research on the impact of process quality improvement and lean practices on manufacturing competitive performance in UAE SME industries has provided valuable insights into the effectiveness of these strategies for enhancing competitiveness. The findings consistently highlight the positive influence of these practices on various aspects of SME manufacturing, such as product quality, operational efficiency, customer satisfaction, and employee empowerment. Empirical research consistently demonstrates that process quality improvement and lean practices lead to reduced waste, optimized resource utilization, and streamlined production processes in UAE SMEs. As a result, these practices help companies achieve cost savings by minimizing inventory costs and enhancing overall operational efficiency. By employing lean practices, SMEs can respond more effectively to market changes, enabling them to maintain competitiveness in dynamic business environments. The empirical research findings highlight the positive impact of process quality improvement and lean practices on employee empowerment and organizational culture within SME manufacturing firms. When employees are actively involved in identifying inefficiencies and suggesting improvements, they become more engaged and committed to the organization's success. This

employee-driven approach fosters a culture of innovation and continuous improvement, creating a competitive advantage for UAE SMEs in attracting and retaining skilled talent.

5. CONCLUSION

The research on the impact of process quality improvement and lean practices in UAE SME manufacturing demonstrates their effectiveness in enhancing competitiveness. These strategies offer SMEs the means to achieve higher product quality, increased efficiency, and a responsive approach to market demands. Emphasizing employee empowerment and organizational culture further strengthens their competitive position. By adopting and refining these practices, UAE SMEs can build a robust foundation for sustainable growth and success in the dynamic manufacturing landscape.

- *Limitations*

While the research presents significant results, there are some limitations to consider. The generalizability of findings may be limited by small sample sizes in some studies, warranting future research with larger and more diverse samples. Additionally, the long-term impact of process quality improvement and lean practices on manufacturing competitiveness requires further exploration to understand their sustained effects over extended periods.

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